

# **Strategic Plan for Facility Operations (2010)**

Adam Walters, 8/11/09

## **Mission**

Operation, maintenance, improvement, design & construction of Computing Division computer rooms, buildings & grounds, office and public areas in the Feynman Computing Center with offices and high availability computing; the Grid Computing Center with high density computing and specific high availability computing rooms (Networking & Tape Robot Room); LCC with LQCD and AMR computing; WH8-Fiber Central and specific office areas in Wilson Hall. The support and services for the areas listed above are provided by Facility Operations and are required for Computing Division to carry out its mission.

## **Current State**

### **Computer rooms:**

- The Data Center availability metrics have exceeded the documented goals. Have kept up with new requirements and procurements by constructing, upgrading & optimizing computer rooms. In the last year, much focus was placed on the improvement of FCC2.

### **Buildings:**

- Have been operating reliably, but have fallen behind in the replacement of aging infrastructure
- Maintenance of critical equipment and infrastructure is performed by FESS or outside contractors.

### **Offices:**

- Kept up with personnel needs, although barely, and need options for growth. There is need for a better office planning process.

## **Vision**

### **Computer rooms:**

- Provide space, power and cooling commensurate with stakeholder computing needs using modern computer room capacity planning practices and tools. Improve power efficiency in operation of computer rooms. Address the need for Test & Development computer room capacity and develop a plan for remote computing rooms.

### **Buildings:**

- Provide reliable operation, maintainability and needed improvements. Adopt industry good practices to decrease energy usage within FCC where possible.

**Offices:**

- Provide sufficient office space to meet personnel needs. Upgrade selected office space to achieve modern esthetics and efficiency standards. Enhance the planning process for office space.

## **Stakeholders**

Computing Division, running experiments, other D/S (BSS, FESS, PPD), GRID users and others

## **Goals and Objectives**

**Computer Rooms:** provide necessary computer room infrastructure maintenance, improvement and operational services for existing and new computer equipment

1. electrical (power & distribution)
2. cooling
3. space
4. fire protection
5. facility monitoring
6. capacity planning

**Buildings:** provide necessary building utilities maintenance, improvement and operational services

1. building structures
2. grounds
3. electrical service
4. heating, cooling and humidification
5. domestic water
6. lighting
7. fire protection
8. emergency systems
9. security

**Offices & Public Areas:** provide suitable & safe working conditions for all CD personnel including

1. adequate work spaces
2. environment: ventilation, air quality, heating, cooling, humidity
3. ergonomics: workstations
4. furniture & storage
5. renovation & construction of offices
6. personnel relocation

## Strategies

### Computer rooms:

1. Provide Data Center capacity to meet computer acquisition timetables and work with stakeholders to plan for space and installations
2. Complete provisioning of remote monitoring for incident alerts and collection and analysis of energy effectiveness of computer rooms and building infrastructure
3. Continue plans to follow FCC1
4. Develop & execute a plan for better capacity forecasting & planning
5. Addition of FCC High Availability capacity (FCC3 computer room)

### Buildings:

1. Execute replacement plans for aging/failing equipment
2. Modernize building and execute improvements
3. Formal maintenance program & documentation

### Offices:

1. Provide options for additional office spaces
2. Integrate Aperture View work flow processes for office planning

## Resource Needs

Capacity planning and forecasting is an area where better processes and tools will be necessary to predict the future needs for data center capacity. This is coupled with development and management of monitoring applications & tools targeted at understanding capacity usage and energy effectiveness. The tools must assist in the planning and change management of computing assets throughout the life cycle (procurement, modification, retirement).

The new applications & tools associated with Capacity Planning, Facility Access & Security, Office Planning, Asset Tracking and other areas require a significant effort by database knowledgeable personnel.

Given the forecast & schedule for new construction of computer rooms, we need to conclude that some existing computing equipment may need to be relocated and incorporate this fact into our planning.

## Progress Indicators

**Computer rooms:** Achieve Data Center Availability Goals as described in the Facility Operations Outages and Availability Report (Docdb# [3123](#)).

**Buildings:** Formalization of process to forecast data center capacity 1-5 years  
Maintain at least 98% reliability of critical infrastructure.

Execution of general building improvements with emphasis on the replacement of FCC heat pumps (office units)

**Offices:** degree to which we meet office space needs of personnel and the Division.

## Project Plan / Schedule

| FY09                    | FY10                                | FY11                                 | FY12                    | FY13                                  | FY14                               | \$M  |
|-------------------------|-------------------------------------|--------------------------------------|-------------------------|---------------------------------------|------------------------------------|------|
| FCC3 HA CR Phase I      |                                     |                                      |                         |                                       |                                    | 4.5  |
| FCC2 CR Cooling Upgrade |                                     |                                      |                         |                                       |                                    | 4.5  |
|                         | Re-Provision GCC CRA <sup>1</sup>   |                                      |                         |                                       |                                    | 0.6  |
|                         | FCC2 UPS Replacement <sup>2</sup>   |                                      |                         |                                       |                                    | 0.3  |
|                         | GCC HA Gen. - NR & TRR <sup>3</sup> |                                      |                         |                                       |                                    | 2.5  |
|                         | LCC Cooling Upgrade                 |                                      |                         |                                       |                                    | 0.6  |
|                         | LCC FlyWheel UPS                    |                                      |                         |                                       |                                    | 2.0  |
|                         |                                     | Computer Room D <sup>4</sup>         |                         |                                       |                                    | 8.0  |
|                         |                                     | FCC CR Fire Det. Upgrd <sup>5</sup>  |                         |                                       |                                    | 0.4  |
|                         |                                     | FCC2 Structural Upgrade <sup>6</sup> |                         |                                       |                                    | 0.4  |
|                         |                                     | FCC Office Improvements              |                         |                                       |                                    | 0.4  |
|                         |                                     |                                      | FCC3 HA CR Phase II     |                                       |                                    | 6.0  |
|                         |                                     |                                      | Computer Room E         |                                       |                                    | 8.0  |
|                         |                                     |                                      | WH Office Improvements  |                                       |                                    | 0.8  |
|                         |                                     |                                      | FCC Office Improvements |                                       |                                    | 1.8  |
|                         |                                     |                                      |                         | FCC Concrete Col. Repair              |                                    | 0.6  |
|                         |                                     |                                      |                         | FCC UPS/Electrical Upgrd <sup>7</sup> |                                    | 5.0  |
|                         |                                     |                                      |                         | Re-Provision GCC CRB                  |                                    | 2.2  |
|                         |                                     |                                      |                         |                                       | GCC UPS Upgrade <sup>8</sup>       | 4.5  |
|                         |                                     |                                      |                         |                                       | GCC CRF (ultra HD/HA) <sup>9</sup> | 6.0  |
|                         | 9.0                                 | 6.0                                  | 9.2                     | 16.6                                  | 7.8                                | 10.5 |
|                         |                                     |                                      |                         |                                       |                                    | 59.1 |

<sup>1</sup> Provision 208V electrical distribution, 15kW/rack density, 42" racks, remove ceiling

<sup>2</sup> Replace end of life Best 60kVA UPS with 100kVA UPS & upgrade electrical distribution

<sup>3</sup> Standby generator for GCC Network Rooms & Tape Robot Rooms and mechanical/cooling

<sup>4</sup> Provision high density Computer Room D and shell for Computer Room E and support areas

<sup>5</sup> VESDA fire detection systems in FCC computer rooms

<sup>6</sup> Modifications to FCC2 structural systems to accommodate racks up to 2000 lbs (908kg)

<sup>7</sup> Replace end of life UPS systems for FCC computer rooms

<sup>8</sup> Replace end of life UPS systems for GCC computer rooms

<sup>9</sup> Provision a computer room for high density / high availability computing

Next Generation Computing Facility – FY10 \$25M; FY11 \$25M